Non-confidential

Vodafone Response to Ofcom's Consultation:

Fixed Wireless Spectrum Strategy

Introduction

Vodafone welcomes the opportunity to contribute to Ofcom's strategic policy formulation regarding fixed wireless spectrum. As a mobile operator we are a key user of such fixed links for the provision of backhaul from our mast network. Although our preferred technology is to utilise fibre, there are significant use cases where this is either not practicable or economically efficient, so being able to provide connectivity using wireless technologies is important and will remain important in the 5G era.

Answers to Questions

Question 1:

Do you agree that we have identified the key drivers likely to have a significant impact on the spectrum demand for fixed wireless links? If not, please provide further detail and evidence to support your answer.

Do you have other comments to make/points to raise with us on these issues?

Vodafone agrees with Ofcom of the key demand drivers for fixed wireless links. Deployment of 5G networks will require greater bandwidth to be supplied to each mast location which will tip economics in favour of fibre connectivity, but conversely 5G networks will lead to a densification of mast networks, meaning additional marginal sites which may only be economically viable using wireless access. Further, as Ofcom correctly identifies, the nature of connectivity will evolve as C-RAN architectures are deployed.

Question 2:

Do you agree with our conclusions on spectrum implications and our proposed strategy/next steps for each band?

Are there any other considerations of significance that you feel we should have included or do you have other comments to make/points to raise with us on these issues?

Please provide as much detail as possible to support your answer.

Vodafone agrees with Ofcom's assessment of each band as set out in Tables 3 and 4 of the consultation.

Question 3:

Do you agree with the items we have identified for further consideration? Are there any other significant areas that you believe should be included? If so, please include all necessary evidence to support your view.

Vodafone agrees with the items identified and don't believe there are any other significant areas that warrant consideration.

Question 4:

Do you agree with our proposal to change the authorisation regime in the 64 – 66 GHz band to licence exempt to create a common authorisation approach across the 57 – 66 GHz band for fixed outdoor installation use and that this would be a benefit to UK citizens and consumers?

Vodafone's assessment of the advantages and disadvantages of each of the authorisation approaches for the 64-66GHz band aligns with that of Ofcom. Whilst equipment being developed for this band cannot quite be described as "pencil beam", the beams are relatively narrow (assuming parameters as discussed in the response to Question 5), hence we consider that the scope for interference with other users is relatively low and this can be mitigated via intelligent self-organising network capability. Further, the existing approach does not deal well with mesh applications, and our vendors will imminently make this capability commercially available. We therefore agree that a migration to a licence-exempt approach is appropriate, to unify the licensing model for the 57-66GHz band.

Question 5:

a) Do you agree with the proposed new technical conditions in Table 6 to facilitate equipment intended for fixed outdoor installation in the 57 – 66 GHz band? Please provide evidenced views /alternatives if you disagree with our proposal. Do you consider any additional conditions should be mandated as part of a licence exemption to manage the interference environment?

b) Do you agree with our assessment that the proposed changes in technical conditions will have minimal impact on existing use and are appropriate to manage the future outdoor interference environment?

c) Are there likely to be any fixed outdoor installation use cases that will require operation at eirp levels above 55 dBm? If so, please provide evidence of how the coexistence with the different outdoor users could be ensured?

It is Vodafone's understanding that Ofcom's approach depicted in Figure and Table 6 aligns with that under development by CEPT. The minimum antenna gain of 20 dBi is compatible with WiGig chipsets and affordable phased array antenna technologies allowing mesh architectures and full duplex transmission. Therefore, Vodafone supports Ofcom's proposed modifications.

Question 6:

a) What are the use cases and technical parameters envisaged for the 66 - 71 GHz band? Are they likely to be similar to those in the 57 – 66 GHz band? If so, what are your views on extending the same or similar technical conditions as described above for the 57 - 66 GHz band (both existing wideband data transmission (SRD) and new fixed outdoor technical conditions) to the 66 – 71 GHz band to facilitate both fixed and mobile use cases.

b) Please provide your view on whether the technical parameters of wideband data transmission (SRD) as shown in Figure 4 are suitable to facilitate mobile/portable equipment including use outdoor? If you do not consider they are suitable, what alternative technical parameters do you think should be considered?

Please provide as much detail to your answer as possible and your considerations on the co-existence aspects.

Vodafone notes the interest in the 66–71 GHz band for future 5G usage and agrees that licence-exempt usage is likely the best model.

We also note that under some predictions, usage of small cell architectures will increase dramatically with consequent usage of wireless links for fronthaul. Whilst this demand will initially be satisfied by usage of the 57-66GHz band, it is possible that this will become congested in some areas, hence the 66-71GHz becoming attractive for that application.

We consider that technical parameters will probably be similar to those of adjacent bands but have nothing further to add as this stage.

Question 7:

Do you agree that there is a continued need for future low capacity fixed link applications?

If so, please provide information to support your view and what alternatives you would consider appropriate should the upper 1.4 GHz band no longer be available.

Please provide clear evidence to support the reasons for your views.

Vodafone does not operate links in this band so consider the answer is best addressed by the incumbent users. We note that if incumbent usage is to continue, then the relevant Annual Licence Fee should reflect the opportunity cost of alternative applications being unable to use the band.

Question 8:

Do you consider there is merit in considering making the bands 52 GHz and 55 GHz available under alternative authorisation approach(es)such as block assignment? If so, what would you consider to be the best approach(es)? Please provide detailed views to support your response.

Question 9:

Do you think we should review our authorisation approach to any other band used for fixed wireless links?

Vodafone has not identified any immediate demand for usage of this band. It is not supported by our principal vendors and we consider macrocell demand can be accommodated by other bands.

Question 10:

a) How do you envisage W band and D band will be used for mobile backhaul provision and the likely timescales? Please provide as much detail as possible on deployment scenarios and whether this would include indoor use. Are there any other types of applications (other than mobile backhaul) that could be suited for these bands?

b) What are your views on the most appropriate authorisation approach for the W and D bands? Please provide as much detail and technical evidence as possible in your answer.

Vodafone is aware of a certain amount of technology trialling of equipment, particularly in the D band. Equipment for D-band will likely be used either on a full duplex/FDD or TDD basis, most likely for fronthaul capability to small cells. However, we do not realistically expect commercial availability of equipment until 2022 at the earliest. As such, although a light-touch regime appears appropriate (potentially, per E-band with a mix of licensed and licence-exempt frequencies), it is premature to reach firm conclusions with respect to licensing models. We would be happy to share intelligence regarding manufacturers trialling equipment in this area in order that Ofcom could liaise directly with them.

Question 11:

Which capacity enhancing technique(s) are you using or planning to use? Please provide detail / evidence and clearly explain why and how each technique is planned to be used and if you consider there are any other aspects that should be considered.

As discussed at the CFI stage, Vodafone sees merit in the band aggregation approach. At this stage we remain agnostic as to the benefits of full duplex operation but will review this should equipment supporting this mode come to market – we do not envisage this until 2022 at the earliest.

Vodafone UK

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